WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

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Washington, D. C. No. 9 July, 1937

Conservation

Murphy, Robert Cushman. Conservation, Bul. Garden Club of America (1615 Twenty-first St., N. W., Washington, D. C.), Sixth Ser. No. 3, May 1937, pp. 32-40.

Summary of the exploitive phase of Caucasian occupation of the country; the necessity of preserving environment; with regard to predators the author says: "I take no exception to the principle and practice of 'control' where it is really called for x x x Neither do I criticize any man's right to prefer one kind of bird to another, provided he extends the same courtesy to me. But I do say that all the sound, unprejudiced information we have points to the conclusion that most predatory birds have an extremely important place in the scheme of things." Value of preventive in comparison to punitive measures in protecting fishes; evils of drainage; and of oil pollution. "When selfishness and irresponsibility toward any aspect of our common heritage becomes universally recognized as bad form--which is far more important than that it should be merely illegal--then despite the expected increase in human population, the treasures of the out-of-doors may become safe for our children and our children's children, until the end of the world."

Conservation: Abuses of pole traps

Gromme, Owen J. The pole trap, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 2(3), March 1937, pp. 20-21.

Pole traps are indiscriminate and destroy some birds of prey that are chiefly beneficial. Notes on food habits of the rough-legged hawk and the marsh hawk. On some game farms 50 benoficial birds of prey worth $250 to the public may be killed in a year.

"Those who use pole traps and particularly the game breeder, must come to realize that there are a far greater number of citizens interested in and vitally concerned with the general public welfare and success of agricultural efforts than those interested in pheasants.

"Pheasants are recognized as valuable game birds (and at certain seasons of the year, insect destroyers) but we must remember that our native birds adequately took care of the insects and furnished excellent game before the pheasant was introduced.

"The state can better afford to furnish ordinary cheap chicken wire covering for open and unprotected rearing pens at game farms, than to sustain the further loss to the public by permitting destruction of the beneficial birds of prey through use of the pole trap."

Conservation: Fur animals

La Budde, Mrs. Edward. The steel trap, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 2(5), May 1937, pp. 14-17.

Great decrease in fur animals; condemnation of steel trap; cooperation of fur users in protective measures.

Conservation: History in Wisconsin

Scott, Walter E. Conservation history, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 2(3), March 1937, pp. 10-15; 2(4), April 1937, pp. 14-20; 2(5), May 1937, pp. 23-30.

State history with reference to certain species of wildlife, and to definite activities of man affecting conservation. The story is largely a chronological one of official regulative measures with remarks upon their effects on the species involved.

Conservation: South Dakota

[Pugsley, C. W., and T. Hillard Cox]. Recreation in South Dakota (South Dakota State Planning Board, Brookings, S. D., 50 cents a copy), 184 pp., illus., tables, mimeographed, 1937.

Notes on game species of the State briefly noting their history and distribution; a tabulation of reports on destruction of wild ducks by "vermin", indicating crows and hawks as most to blame; the State's wildlife conservation program; big-game and waterfowl refuges in the State (locations mapped); proposed refuge areas; the "vermin" menace; commercial aspects of hunting and fishing.

Conservation: Waterfowl

Brant, Irving. The waterfowl and common sense, Emergency Conservation Committee (734 Lexington Ave., New York, N. Y.) Publication 64, 12 pp., 1937.

Review of the recent history of waterfowl and strong plea for a closed season.

Control: Bounty system

Handley, C. O. Do hawks and owls kill quail?, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 14(2), Spring 1937, pp. 14-18, 7 figs.

Reprint from the Richmond Times-Dispatch in this more available and permanent medium. Definition of the more destructive and the less obnoxious groups of hawks, and plea for discrimination in their treatment. Opposition to bounty payments as being indiscriminate, inviting fraud, expensive, and ineffective. Spending the money for improvement of environment would do quail much more good.

Control: Bounty system

MacDonald, Kenneth F. Necessity for uniform bounties on predators, California Fish and Game (450 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 66-67.

Mostly on frauds; gopher skins submitted as those of coyote pups; coyotes raised for bounty; payment of bounties for animals from other States, hence the plea for uniformity. Substitution of the paid hunter system seems not favorably considered.

Control: Deer damage to gardens

Dale, Bonnycastle, Jr. Red deer invaders, Canadian Forest and Outdoors (Montreal, Canada, 20 cents a copy), 33(5), May 1937, pp. 144-145, 1 photo.

White-tailed deer in Nova Scotia, eat practically all garden plants; scarecrows and a watchdog deterred them only temporarily, but a seven-foot fence, the lower four feet with strands 6 inches apart, keeps out the deer, as well as rabbits and porcupines.

Control: European rabbit in Australia

Stead, David G. The rabbit in Australia (Winn & Co., Balfour St., Sydney, Australia. Also obtainable from Ulaws, 42 Torrington Sq., W.C. 1, London, England, 2 shillings, 2 pence), 1935, 108 pp., illus.

The author formerly Special Rabbit Menace Enquiry Commissioner, and author of a previous publication on the rabbit problem in New South Wales, gives the history of the introduction and spread of the animal in Australia. The rabbit now occupies the southern two-thirds of the continent, about 2,000,000 square miles. The animal is termed Public Enemy No. 1. All known methods of control are discussed including fencing (the longest stretch of which is 696 miles), destruction of cover, trapping, poisoning, fumigating, the use of dogs, ferrets, shooting and driving, selective destruction of females, and the use of natural enemies and diseases. The most effective control is fumigation with calcium cyanide. Poisoning is thoroughly condemned because of its destruction of farm stock and wildlife. Diseases have proved useless and natural enemies ineffective. The fur trade tends to sustain the rabbit pest and public lands foster the animals. Concerted action with cyanogas is the author's formula for dealing with the ubiquitous rabbit.

Control: Rodents in Montana

Cates, E. C. Control of rodent pests in Montana, Montana State College Extension Service Bul. (Missoula, Mont.), 151, 32 pp., illus., Feb. 1937.

Range, description, and habits of 12 kinds of rodents and 2 of rabbits, with suggested control measures for each. Distribution maps show the approximate ranges of the Columbian, Richardson, and armatus ground squirrels, and of the prairie dog.

Control: Side hunt for jays

Erickson, Mary M. A jay shoot in California, The Condor (2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 39(3), May-June 1937, pp. 111-115.

A team shoot, the conditions under which carried on, and the results described. Birds brought in were California jays 398, Steller's jays 214, red-tailed hawk 1, Cooper's hawk 1, and sparrow hawks 3. The hunt covered about 200 square miles with a population of one jay to about every 5-1/2 acres or about 11,600 in all. "On this basis the shooting of 612 jays resulted in the destruction of about 5 per cent of the jay population." "A reduction of 5 per cent, even if of annual occurrence, would probably have little effect upon the year-to-year population of jays."

Control: Turtle trap

Anon. Turtle trap at low cost, Coastal Sportsman (P. O. Box 2547, Beaumont, Texas, 5 cents a copy), June 1937, p. 9, 2 photos.

Description of a home made trap that can be constructed at low cost, and is said to be very effective.

Control: "Vermin" problem

Hamilton, W. J., Jr. The value of predatory mammals, Bul. N. Y. Zool. Soc. (New York Zoological Park, New York, N. Y., 30 cents a copy), 40(2), March-April 1937, pp. 39-45, illus.

Regardless of scientific findings, campaigns for "vermin" control still are carried on but there is little evidence that they have resulted in increase of game species. Discussion of food habits of coyote, red fox, eastern skunk, and weasel, and the conclusion drawn that each is more beneficial than injurious in its feeding habits. Examples given of relationships between organisms that may be disturbed to man's disadvantage unless warranted by full knowledge. Value of predators in relation to prey, as fur producers, and controllers of injurious species upon which they feed. Undesirable features of bounty payments. The persecution of "vermin" ordinarily indulged in by sportsmen"is all but baseless and is thoroughly unjustified in the light of cold scientific facts."

Cycles

Baashuus-Jessen, J. Periodical fluctuations in the population of small game, Norges Jeger- and Fisker-forbunds Tidsskrift 2-3(36), 1937, pp. 12-15.

A superabundance of small rodents especially of Microtus in Norway culminating in 1934 led to a considerable increase in predators. The mice abruptly decreased by 1935 and the predators were forced to turn their attention to hares, willow grouse, and other game birds, and the year 1936 was one of the most marked years of scarcity as regards game that had ever been experienced. Eagles, hawks, and foxes are reported even "to have made really desperate attacks on man and animals in inhabited districts."

Causes that may have been responsible for the drop in the mouse population are discussed and epidemic disease is rejected as a primary agency. The true reason for the decrease is thought to be a sudden thaw producing conditions under which the animals are exposed to wet, resulting in freezing and drowning, and also to death due to a combination of loss of body heat and deficiency disease. "Meteoropathology and deficiency diseases first and foremost, not epidemology, ought to be focussed upon when dealing with the problems of fluctuations in the population of small game."

Cycles

Chitty, Dennis H., and Charles Elton. The snowshoe rabbit enquiry 1935-36, Canadian Field Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 51(5), May 1937, pp. 63-73, 3 figs. (maps), 2 tables.

The maps show areas in which increase and decrease in 1935-36 as contrasted to 1934-35, and those in which epidemics were reported in 1935-36. The author's summary is: "595 reports were received from Canada, one from Anticosti and one from Newfoundland. The percentage by area reporting increase has lessened steadily during the five years 1931-36. Decrease values have grown in the reverse manner. Epidemics, after a high incidence in 1934-35 show signs of abating except in the Quebec Peninsula. Although conditions are reported varying from abundance to recovery after extreme scarcity, in most places 1935-36 has witnessed conditions either at or very close to the bottom of the cycle. Abundance is still reported from Anticosti and Newfoundland.

"97 reports were received from the United States, and 3 from Alaska. In the Eastern area of Lepus americanus the cycle appears to have reached its minimum and there is recovery in places. In the Western area of Lepus bairdi and L. washingtoni fluctuations were not well-marked, a high proportion of areas reporting 'no change'. In Alaska, populations were still at high density in most areas, but there were local reports of decrease setting in."

Cycles: Microtus

Hamilton, W. J., Jr. The biology of microtine cycles, Journ. Agr. Research (Supt. of Documents, Washington, D. C., 20 cents a copy), 54(10), May 15, 1937, pp. 779-790, 2 figs., 2 tables.

Review of literature of which a bibliography of 13 titles is presented; all available evidence points to a 4-year cycle for microtines. This study

relates to Microtus p. pennsylvanicus near Ithaca, N. Y. The home range of an individual is small, usually not exceeding 2,000 square feet. Populations ranged from 15-40 to 150-230 per acre at different phases of the cycle. As the cycle waxes there is an increased number of litters per female and an increased number of young per litter. Epizootics, when the mice have reached the peak of their abundance, are the primary agent reducing populations. Cycles are so regular that forecasting periods of abundance is possible; this enables inauguration of control methods before the maximum in population is due.

Cycles: Refuges in relation to

Edminster, F. C. An analysis of the value of refuges for cyclic game species, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 37-41, 3 tables.

Game populations on refuge areas underwent the same fluctuations as those on a nearby public shooting ground.

Destruction: Pheasants, by hay cutting

Leopold, Aldo. 1936 pheasant nesting study, Wilson Bul. (Morningside College, Sioux City, Iowa, 60 cents a copy), 49(2), June 1937, pp. 91-95, 2 tables.

In a study of 23 tracts of fresh-cut hay stubble, totalling 141 acres in 3 districts of Wisconsin, 42 nests (all but one of pheasants) were found; of these 24, or 57 percent, had been destroyed by the cutting, in 5 cases including the hen. Young rabbits and meadow mice also were killed in numbers. Of the 19 nests destroyed by cutting without known loss of the hen, all were deserted. Crows seem to get most of the eggs exposed by mowing within a few days, especially if the eggs were scattered; some eggs not scattered were never found by crows. Hayfields apparently are nested in for lack of better cover and providing such cover is a good way of keeping the birds out of the fields. Flushing bars are not very useful except where adequate fence-row cover is out of the question.

Destruction: Winter killing

Leopold, Aldo. The effect of the winter of 1935-36 on Wisconsin quail, American Midland Naturalist (University of Notre Dame, Notre Dame, Ind., 50 cents a copy), 18(3), May 1937, pp. 408-416, graphs, tables.

A 11-year cycle is mentioned, the down-grade of which occurred in the years 1932-36. In 1935-36 winter killing on several areas was estimated to run from 30 to 83 per cent. A formula is suggested for expressing the lethal effect of severe winter weather. Fat quail as well as lean were killed by the 1935-36 winter, well filled crops did not avert disaster, and the sexes

perished in about equal ratio. Upon trial no size or size-measurement indices could be developed that were superior for rating emaciation to Errington's diagrams of cross-sections of the breast. There is a bibliography of 12 titles.

Disease: Autopsies

Shillinger, J. E., and Wm. Rush. Post-mortem examinations of wild birds and mammals, U. S. Dept. of Agriculture Misc. Publ. 270 (Supt. of Documents, Washington, D. C., 5 cents a copy), 15 pp., 6 figs., May 1937.

Noting and reporting disease conditions; performing autopsies on mammals and birds; 8 common causes of wildlife losses with notes on symptoms and lesions; preserving specimens for study; shipping specimens and where to ship; safeguarding investigators against infection.

Disease: Eel-grass

Renn, Charles E. The eel-grass situation along the middle Atlantic Coast, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 323-325.

About the same information as in the article abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 7-8.

Disease: Eimeria in flying squirrel

Roudabush, Robert L. Two Eimeria from the flying squirrel, Glaucomys volans, Journ. Parasitology (Science Press, Lancaster, Pa.) 23(1), Feb. 1937, pp. 107-108, 2 figs.

The host an additional genus to be reported as harboring Eimeria. Two species recorded of which one E. glaucomydis is described as new. Iowa.

Disease: Leeches infesting waterfowl

Scoter, Clarence A. Leeches infesting young waterfowl in Northwest Iowa, Journ. Parasitology (Science Press, Lancaster, Pa.), 23(1), Feb. 1937, pp. 108-109.

Theromyzon occidentalis in nostrils of coot, pied-billed grebe, and blue-winged teal. Details of infestation which may have caused some deaths.

Disease: Parasites of ruffed grouse

Connell, Frank H., and H. M. Dorenus. Endoparasitism in ruffed grouse near Hanover, New Hampshire, The Auk (3200, 22nd St. N., Arlington, Va., $1.00 a copy), 54(3), July 1937, pp. 321-323.

In 70 grouse, all shot within 15 miles of Hanover, 15 birds had the caeca infested by the flagellate, Trichomonas bonasae. The nematode, Ascaridia lineata, occurred in 22 specimens. The investigation covered 2 years, the second one of grouse scarcity, but there is no evidence that parasitism had anything to do with the decrease.

Disease: Parasites of salamanders

Rankin, John S. An ecological study of parasites of some North Carolina salamanders, Ecological Monographs (Duke University Press, Durham, N. C., $1.50 a copy), 7(2), April 1937, pp. 171-269, 15 figs (graphs), 11 tables.

Field methods; ecology of hosts; lists of hosts with their parasites both for North Carolina and the United States; ecology of parasites; discussion and conclusions; check list of parasites of North American salamanders; keys to these parasites; extensive bibliography.

Disease: Plague in marmots

[Eskey, C. R.] Plague infection discovered in fleas and lice taken from marmots in Montana and in a marmot from Utah, U. S. Public Health Reports (Supt. of Documents, Washington, D. C., 5 cents a copy), 51(34), Aug. 21, 1936, pp. 1159-1160.

First report of plague in marmots in America and demonstration that the infection may be identified in lice and fleas.

Disease: Salmonella pullorum in quail

Emmel, M. W. Pullorum disease in captive quail, Journ. Amer. Vet. Med. Assoc. (221 N. La Salle St., Chicago, Ill., 40 cents a copy), N. S. 42(6), pp. 716-717.

Losses on a Florida quail farm were traced to this cause, the infection being transmitted to a considerable extent in incubators. "While it is not likely that pullorum disease is of particular importance in wild quail at this time, the release of pullorum-infected birds from quail farms is a potential menace to the future welfare of this game bird, particularly at this time, when the restocking of the wild supply is a conservation program of many states."

Disease: Tularemia

Lillie, R. D., E. Francis, and R. R. Parker. The pathology of tularaemia, National Institute of Health Bul. 167 (Supt. of Documents, Washington, D. C., 40 cents a copy), 217 pp., illus., Feb. 1936.

Divided into 14 chapters of which 2 relate the pathology of inoculated tularemia in the house mouse and white rat, and 7 to that number of wild mammals and birds; there are also 2 chapters devoted to briefer accounts of

the disease in miscellaneous mammals and birds. The descriptions of lesions are detailed and well illustrated. There is an extensive general bibliography.

This publication is not an account of tularemia in the wild.

Disease: Worm parasites

Van Cleave, Harley. Worm parasites in their relations to wildlife investigations, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 21-27.

Universality of worm parasites; possibilities of controlling them; need of study as to what constitutes normal health of animals, as to their parasites and the responsibility of the parasites for pathological conditions, and as to the possibilities of treatment and control when required; suggestions for such studies; instances showing the importance of parasites; quarantine and other control measures; fish parasites; integration of research.

Disease: Addendum: Atebrine vs. Leucocytozoon

Coatney, G. Robert, and Evaline Yost. Some notes on the effect of atebrine on the gametocytes of the genus Leucocytozoon, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(2), April 1937, pp. 227-228.

Drug administered by mouth to an infested great horned owl and a red-tailed hawk seemed to have some effect on the parasites but further experiments are necessary to determine the practicability of its use.

Disease: Addendum: Blood parasites

Wood, Fae D., and Sherwin F. Wood. Occurrence of haematozoa in some California birds and mammals, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(2), April 1937, pp. 197-201, 12 figs.

Report on examination of the blood of 203 birds of 21 species and 185 mammals of 18 species. Negative as well as positive cases are cited and for the latter, a considerable variety of blood infesting micro-organisms. The parasites found in thrushes, house finches, wood rats, and meadow mice are given special mention. Bibliography of 5 titles.

Disease: Addendum: Catalog of Leucocytozoon

Coatney, G. Robert. A catalog and host index of the genus Leucocytozoon, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(2), April 1937, pp. 202-212.

List of 68 species with date of description, name of author, and host of each; host index; and long bibliography.

Ecology: Animal relations to soils

Van Dorsal, Wm. R. The dependence of soils on animal life, National Association of Audubon Societies (1775 Broadway, New York, N. Y.), 7 pp., May 1937.

Essentially a review of the literature (50 titles cited) of animal relations to soil formation and soil conservation. Author's summary:

"1. Animals that by trampling or other means compact the surface soil tend to increase run-off and, consequently, intensify any erosion hazard that may be present.

"2. Animals that burrow into the soil and thus increase its porosity tend to reduce run-off and thereby decrease the erosion hazard. The latter conclusion is not invalidated by the rare, isolated instances, where through combinations of circumstances often directly traceable to the intervention of man, rodent burrows have been shown to be primary causes of erosion.

"3. In general, animal presence and activities in soils materially assist in the mixing, loosening, aeration, drainage, and fertilization of soils, thereby permitting the increase of plant life, and by a combination of all these factors promote the conservation of soils."

Ecology: Measuring range utilization

Pechanec, Joseph F., and G. D. Pickford. A comparison of some methods used in determining percentage utilization of range grasses, Journ. Agr. Research (Supt. of Documents, Washington, D. C., 20 cents a copy), 54(10), May 15, 1937, pp. 753-765, 5 tables.

Volume by weight, stem count, and ocular estimate methods are described and compared. The ocular estimate by average of plants is preferred for rapidity and relative accuracy. Bibliography of 7 titles.

Ecology: Olympic elk herd

Authors. Stability of animal communities in climax areas, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(12), Dec. 1936, pp. 1077-1079.

Three letters. One by Richard H. Pough, National Association of Audubon Societies, urges perpetuation of natural conditions on the Olympic Peninsula, Washington, not only for the benefit of the elk, but also for ecologists to whom preservation of wilderness areas is a great need. C. J. Buck and H. L. Shantz of the Forest Service doubt the feasibility of maintaining natural conditions and recommend management both of trees and of the animals.

Ecology: Survey of game and furbearers of Missouri

Bennitt, Rudolf, and Werner O. Nagel. A survey of the resident game and fur-bearers of Missouri, University of Missouri Studies (Columbia, Mo., cost after free edition is exhausted $1.25 a copy; with reference to free edition, write to authors), 12(2), April 1937, 215 pp., 8 figs.

History of wildlife including extirpations. Development of protective measures in relation to changes in human activities. Charts of open seasons and bag limits show that restrictions in these respects have been applied to all of the principal game species, and in greater degree in quite recent times to half of them. Statement of the methods used in the Survey and of its objectives and limitations. An inventory was impossible so the Survey is frankly extensive and it is limited to the more important species. There is a discussion, with map, of the zoogeographic regions of the State and an annotated catalogue of the important resident game, furbearers, and predatory birds and mammals. The accounts by species treat history; environment; predators, parasites, and diseases; problems of population; and social, economic, and legal considerations; the headings varying according to the available information. There are chapters on 6 game birds; 3 on game mammals (deer, squirrels, and rabbits); 11 on furbearers, including the red and gray foxes; and 7 on predators, treating the house cat, dog, wolf, coyote, bobcat, hawks, owls, and the crow. There is a chapter on administration, also, suggesting a game restoration and management program. Several appendices give recent or other supplemental material. One on breeding reserves and maximal population calls further attention to limitations in the objectives of the Survey. This section includes a table estimating the breeding reserve (1935) of the species treated and the maximal population that might be produced in a year from the estimated nucleus. The report contains a wealth (scarcely suggested here) of detailed information relative to the wildlife of Missouri and provides an excellent foundation for the operation of the new non-partisan Conservation Commission recently provided for by change in the State constitution of Missouri by popular vote.

Economics: Value of fur animals in Michigan

Stobler, A. M. A fortune in predators, Michigan Conservation (State Office Bldg., Lansing, Mich.), 6(10), April 1937, pp. 3-4, illus., tables.

General discussion of biological relationships of predators. Tabulation of furs taken in the 1934-35 season by species, approximately half a million in all; also those shipped in 2 yearly periods 1796-97 and 1800-01 from the post at St. Joseph, Mich. "In any wildlife management program, due consideration should be given to the values of the predatory species."

Education

McConnell, Robert. Attitudes toward certain proposed social actions as affected by defined educational content, Purdue University, Division of Educational Reference (Lafayette, Ind., $2.25 a copy), Studies in Higher Education Bul. XXXI, pp. 70-104, December 1936.

This is the report of an experiment designed to find out whether or not the persons tested were affected by the reading of articles which were designed to influence their attitudes toward defined objects. Those used were: (a) Allowing the Government to tell the farmer how to farm, (b) allowing each farmer to farm as he pleases, (c) clean farming, (d) taxing all the people to plant new forests, (e) draining swamps. The tests were given to school pupils from grades seven to twelve. Results of the experiments showed that there were significant shifts of attitude in the direction intended by the contents of the articles. Tests were given a year later which showed that the changed attitudes persisted with but slight change.

The experiment demonstrates the value of conservation education in the public schools as a means of creating favorable attitudes toward conservation subjects.-Edwin B. Steen.

Education: Agricultural colleges in relation to wildlife management

Bode, I. T. The State College and its place in wildlife management, Connecticut Forester (Conn. State College Forestry Club, New Haven, Conn.), 1937, pp. 7-10.

Wildlife management being a function of land management it necessarily follows that the State agricultural colleges, by virtue of the attention they have given, and must continue to give, to land problems, should be looked to for initiative and leadership. Their favorable position is undisputed but their activities may be in need of stimulation and integration along the lines of research, education, and application in land-use practices. Research on habitat requirements and ecological relationships is a fundamental need, but of equal importance is showing how to make use of the information we do have or can produce in relating wildlife production to land use. The agricultural colleges should lead the way in both of these fields. The economics of wildlife management have not received enough attention and should be made a subject of research, especially in relation to marginal lands. The necessity of better balanced land use is now universally recognized and achievement of such use depends upon better land planning. Agricultural colleges should be leading in this movement and in getting essential information on all phases of the problem to the farmer.

Education: CCC in forest wildlife

Kylie, H. R., G. H. Hieronymus, and A. G. Hall. CCC forestry, U. S. Dept. of the Interior, Office of Education, clothbound, 335 pp., illus., 1937 (Supt. of Documents, Washington, D. C., $1.00 a copy).

Chapter 10, pp. 201-220 is devoted to Wildlife Management. Subheads indicating the contents are: "Classification of Game; Forestry and Wildlife, wildlife and recreation, Wildlife of the past, Wildlife of today; Problems of Game Management; Values of Wildlife; Management of Small Game, Cover, Food, Stocking, Laws; Management of Big Game, Homes, The Yellowstone herds, Solving big-game problems; Management of Carnivores; Managing Migratory Fowl; Fish

Management, Protecting fish streams, Improving streams and ponds, Planting and restocking, Laws; Summary, The outlook." The book, well made and lavishly illustrated, is an attractive text.

Education: Conservation

Bristow, Wm. H., and Katherine M. Cook. Conservation in the education program, U. S. Dept. of the Interior, Office of Education, Bul. (Supt. of Documents, Washington, D. C., 10 cents a copy), 4, 78 pp., 1937.

Conservation a national policy; conservation and the school program; representative practices in conservation education (7 States); instruction through special circulars and bulletins (3 States); observance of conservation week (4 States); use of experience and activity units in conservation (suggested activities; bibliography); conservation in teacher-education institutions (20 in all); conservation in organizations and agencies (both Federal and non-governmental); general bibliography of 8 pages.

Education: Popular account thrushes and mimids of New Jersey

Hausman, Leon A. The thrushes and mimids of New Jersey, New Jersey Agr. Expt. Sta. (New Brunswick, N. J.), Bul. 618, 32 pp., 27 figs., Jan. 1937.

Summary of food and general habits; notes on identification and range within the State; brief description and illustration of 8 species of thrushes and 3 of mimids.

Education: Wisconsin ecological demonstration

Riis, Paul B. Ecological garden and arboretum at the University of Wisconsin, Parks & Recreation (327 West Jefferson St., Rockford, Ill., 25 cents a copy), 20(8), April 1937, pp. 382-389, 5 photos; 20(9), May 1937, pp. 451-457, 6 photos.

800 acres reserved for preservation of ecological and geographic groups of Wisconsin wildlife and to serve as an outdoor laboratory for cultural students of natural history. In relation to wildlife the plan is to demonstrate the possibility of increasing both number of species and carrying capacity of the range, and to apply biological science sincerely to the solving of biological problems.

Food Habits: Badger

Errington, Paul L. Summer food habits of the badger in northwestern Iowa, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 213-216.

Description of habitat and report on analyses of 37 fecal passages, separated into semi-monthly lots. Ground squirrel remains made up about 53 percent of the fecal bulk; mice, 30 percent; and insects (mostly Hymenoptera and

Coleoptera), 9 percent. Discussion of minor food habits and of field observations also is included.

Food Habits: Black bear

Murie, Adolph. Some food habits of the black bear, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 238-240.

Jackson Hole-Yellowstone region, Wyoming. Old and young feeding on crickets and grasshoppers.

Food Habits: Damage to corn

Hendrickson, George O., and Clifford Schlesselman. Wildlife's toll of a food patch of corn, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 236-237.

A field of corn adjoining a wildlife refuge was visited during the exceptionally severe winter of 1935-36 by squirrels, mice, cottontails, rats, and birds. Corn consumed or wasted by cottontails was approximately 3 bushels; that eaten by mice 1 bushel; and that by squirrels 0.8 bushel. The total yield of corn on 2.2 acres was estimated to be 88 bushels. Wildlife harvested about 5.4 percent of the crop.

Food Habits: Deer and elk

Wyckoff, Stephen N. Annual Report Northern Rocky Mountain Forest and Range Experiment Station (Missoula, Mont.) 1936, mimeographed, 77 pp., 1937.

Wildlife research (pp. 49-52) reports progress on studies of food habits of big game mammals, and on numbers and winter movements of deer and elk. Mention is made also of limited work on parasites and diseases and the beginning of an investigation of damage by sheep to upland game birds. The food habit studies were carried out by separating, weighing, and identifying the food items. The ten species of most importance were for deer (59 stomachs): Douglas fir, western red cedar, lodgepole pine, Oregon grape, kinnikinnick, mountain lover, willow, snowbush, serviceberry, and juniper; and for elk (53 stomachs): Wheatgrass, pine grass, bluebunch grass, willow, sedge, June grass, bluegrass, lodgepole pine, serviceberry, and mountain maple.

Studies of utilization yielded some interesting comparative results that may be expressed in tabular form:

Forage Group	Palatability for				
	Whitetail Deer	Mule Deer	Elk	Cattle and Horses	Sheep and Goats
Grasses	35	36	57	57	38
All woody species	17	17	28	13	35
Shrubs	31	31	35	8	24
Coniferous species	24	24	27	0	0
Lichens and mosses	54	54	58	0	0

Food Habits: Food supplies and their utilization

Allen, Durward L. Dinners from weeds, Michigan Conservation (State Office Bldg., Lansing, Mich.), 6(10), April 1937, pp. 5-6, illus.

Preliminary report on a study made on the W. K. Kellogg farm near Battle Creek, Mich. of the food supplies available for wildlife and their utilization. Importance of ragweed, lambs-quarters, foxtail, and other weed seeds to pheasants and quail. The ten leading food supplies for songbirds according to frequency of consumption were ragweed, lambs-quarters, bluegrass (2 species), catnip, redroot, bergamot, sheep sorrel, pigweed, and dropseed. Scientific names of these are given. "Of the species under observation, quail seemd to have the greatest difficulty in finding food."

Food Habits: Mule deer

Robinson, Cyril S. Plants eaten by California mule deer on the Los Padres National Forest, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 35(3), March 1937, pp. 285-292.

Essentially the same material abstracted in WILDLIFE REVIEW, No. 4, June 1936, pp. 7-8, the definite palatability ratings, however, omitted. Bibliography of 5 titles.

Food Habits: Pheasant

Dalke, Paul L. Food habits of adult pheasants in Michigan based on crop analysis method, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 199-213, 3 figs. (graphs), 11 tables.

This is the first food habits investigation of any extent in the United States that employs the dry weight method. The technique is described. Analyses were made of 352 crop contents. Observations on the period of feeding activity embracing 3,832 pheasants are reduced to the form of a graph, and correlated with average weights of crops collected at various hours. The author's summary is as follows:

"1. Pheasants feed little during the middle of the day, summer or winter.

"2. The crop is not always full when the bird goes to roost, even though food is abundant. Approximately 14 per cent of the pheasants collected at sundown had full crops. In all cases, however, other parts of the digestive systems were full of food.

"3. Habits of feeding are not uniform but are very regular with certain flocks. Areas of wild fruits are completely utilized by daily feeding throughout late fall and winter.

"4. The pheasant is an omnivorous feeder; the greatest variety of seeds and fruits eaten occurred in October when 106 species were recorded.

"5. The high percentage of grain eaten by pheasants is not an indication of damage to grain crops. Most of the grain consumed is waste, either from harvesting or planting, or from manure spread on the fields. Corn, wheat, and barley comprise 83 per cent of all the grain eaten.

"6. In the pheasant territory of Michigan, the most common wild seeds eaten were ragweed, yellow foxtail, skunk cabbage, and green foxtail. Ragweed accounted for 51 per cent of all the seeds eaten. Wild fruits and nuts are eaten consistently, but their percentage is small (7.48), since the habitat of these species are restricted to a relatively small proportion of the pheasant range.

"7. Adult pheasants are not large consumers of insects and other invertebrates in comparison with plant food eaten. The common belief that grasshoppers are consumed in large quantities is not borne out by the investigation."

There is a bibliography of 10 titles.

Food Habits: Prairie pocket mouse

Blair, W. Frank. The burrows and food of the prairie pocket mouse, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 188-191, 1 table.

Perognathus hispidus maximus in Rogers County, Okla. Description of burrows, and tabulation of food stores found in 18 of them. On the basis of frequency, seeds of Gaillardia pulchella and of Opuntia rank as the most important foods. A list is given of 26 identified plant items and there are remarks on the insect diet. Availability is the most important factor in the selection of food.

Food Habits: Rabbit damage to trees

Anon. Damage from rabbits--a consideration in shelterbelt planting, Technical Notes Lake States Forest Experiment Station (St. Paul, Minn.), No. 121, 1 p., multilithed, Jan. 1937.

Table showing trees damaged, and degree of injury, in two plantations in Oklahoma. The species attacked most frequently are the tamarisk, Chinese elm, hackberry, catalpa, desert willow, American elm, and honey locust.

Food Habits: Red squirrel

Yeager, Lee E. Cone-piling by Michigan red squirrels, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 191-194, 2 tables.

Sciurus hudsonius loquax in Saginaw Forest near Ann Arbor. Caches were largely composed of cones removed from the trees by the squirrels; they averaged about 4 bushels each. They were generally located near or under the heaviest bearing trees. Assuming that the animals eat 2 grams of spruce seed per day, it was calculated that the 32.4 bushels of cached cones would provide enough food to carry a population of 65 squirrels through the coldest 5 months of winter.

Food Habits: Red squirrel damaging larch

McCulloch, W. F. Red squirrels attack Japanese larch, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(7), July 1937, pp. 692-693.

Of European and Japanese larches grown under apparently identical conditions, the former were undamaged, the latter trimmed to such an extent as to appear stunted by contrast. The larger buds of the Japanese species seem to be the attraction.

Food Habits: Skunk

Kelker, George H. Insect food of skunks, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 164-170, 4 tables.

Review of previous reports, all of which show "that the skunk's food is, to a large extent, composed of insects." The present investigation was of droppings only and the proportions of food items were estimated by volume. Insects averaged a little more than 61 percent of the total volume of some 950 scats collected in three years. Ground beetles, leaf-chafers, and Orthoptera were prominently represented. Economic status of the animals on a sanctuary in Michigan, judged solely on the insect food, was of doubtful positive value in the early part of the season, but of decided positive value for the late summer and fall seasons.

Life History: Field mouse

Hamilton, W. J., Jr. Activity and home range of the field mouse, Microtus pennsylvanicus pennsylvanicus (Ord.), Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 255-263, 2 figs. (graphs), 1 table.

Author's summary: "Voles are more active by day than by night. The period of greatest activity occurs shortly after dawn and in the hours preceding dusk. Predation possibly plays a selective part in determining periods of greatest activity, for less activity on the part of vertebrate enemies is apparent during early morning and late afternoon. The home range of an individual vole seldom encompasses an area in excess of 1/15 of an acre. 'Homing instinct,' while not developed as well as that in some cricetine rodents, nevertheless permits Microtus to return to its home range when repeatedly liberated at distances varying from one hundred to two hundred and fifty yards."

There is a bibliography of 14 titles.

Life Histories: Flight speed

Cooke, May T. Flight speed of birds, U. S. Dept. of Agriculture Circ. 428 (Supt. of Documents, Washington, D. C., 5 cents a copy), 13 pp., table, May 1937.

Notes on estimated and measured speeds, variation in speed and effect of various factors, a 4 page table chiefly of records of flight speeds but including a few of running; bibliography of 86 titles.

Life Histories: Mountain sheep

Mills, Harlow B. A preliminary study of the bighorn of Yellowstone National Park, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 205-212.

Despite rigid protection, the herds have remained at about the same total number (about 200) for many years. The numbers, distribution, and migrations of ten groups are treated. There are notes on calls, feeding and bedding habits, tracks and sign, reproduction, loss of lambs, food, predators, parasites, and diseases. The most important limiting factor appears to be depletion of winter forage by the elk. Reduction of the wapiti herd is advisable for the sake of those animals themselves as well as for the welfare of the bighorn. Even with that aid, and with ample rainfall, it will take several years to bring the winter bighorn range back to normal.

Life Histories: Pheasant nest mortality

Errington, Paul L., and F. N. Hamerstrom, Jr. The evaluation of nesting losses and juvenile mortality of the ring-necked pheasant, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 3-20, 1 fig., 8 tables.

Analysis of productivity of the ring-necked pheasant in Iowa based on studies of 503 nests in the years 1933 to 1935. Nesting losses calculated on data of varying completeness run from 59 to 77 percent. Viewed uncritically, these appear alarming, but considering renestings, it is clear that from 70 to 80 percent of the hens finally succeed in bringing off broods. Nestings begun early or late are not so successful as those of the median part of the nesting season. "Success or failure of clutches seemed to bear less evident relation to appraised quality of nesting cover than might have been expected; nor has there seemed to be any clear connection between differences in kinds and numbers of nesting enemies and the intensity of depredations upon eggs as manifested from year to year." As a management measure, creation of new habitats in pheasant-vacant spaces is preferable to improvement of nesting grounds already fairly suitable. The exclusion of livestock from cover and the more judicious control of burning are other practices that may improve nesting conditions.

Life Histories: Red fox; distribution and survival

Errington, Paul L., and R. M. Berry. Tagging studies of red foxes, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 203-205.

Of 5 pups tagged and released within two miles of the home den, 2 were trapped the following winter at distances of 16 and 18 miles from their natal locality; the other 3 disappeared. Of 236 young foxes released at some distance from the home range, 16 were trapped or shot during the first, and 1 additional in the second, winter. The distances of the points of capture from those of release varied from 2 to 96 miles. Of 55 foxes released at the age of several months, 10 were reported killed during the following winter. These animals had left their starting points from 10 to 160 miles behind. Iowa.

Life Histories: Skunk

Hamilton, W. J., Jr. Winter activity of the skunk, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 326-327, 2 tables.

Author's summary: "A study of hibernation of the skunk in central New York was conducted during the winters of 1931-32 and 1933-34. Females are confirmed hibernators; males are more or less active throughout the winter. Low temperatures appear to be the exciting cause of winter sleep. During the mating season, sub-zero temperatures fail to keep skunks in their dens. The data suggest a segregation of sexes during hibernation. While individual adults rarely hibernate for more than a month at a time, immature animals usually sleep throughout the winter, rarely venturing from their dens until mid-March. During winter, males show an average loss of one-seventh of their weight, females a loss of approximately two-fifths their weight."

Life Histories: Vultures, hawks, eagles

Bent, Arthur C. Life histories of North American birds of prey, U. S. National Museum Bul. 167 (Supt. of Documents, Washington, D. C., 70 cents a copy), 409 pp., 1102 pls., June 1937.

Tenth volume of this notable work compiling the published and contributed experience of the author and other ornithologists on the habits, eggs, young, plumages, food, enemies, range, and migration of our birds. The present volume covers the vultures, kites, accipitrine and buteonine hawks, the eagles, and the osprey.

Management: Bobwhite in Texas

Lehmann, V. W. Increase quail by improving their habitat, Texas State Game, Fish, and Oyster Commission (Austin, Tex.), 44 pp., 18 photos, May 1937.

Applying to Texas conditions the work of Stoddard and other writers on quail together with his own very comprehensive personal knowledge, the author has presented a logically arranged, closely reasoned, and well written report that should carry conviction to the farmers and sportsmen of the State. The varying fortunes of the quail as affected by changes in agricultural practice are traced; a definite decline, still continuing, began with the clean-up of farms as one of the methods of cotton boll-weevil control. The usual restocking and vermin-killing nostrums were tried but proved expensive disappointments. On this subject the author remarks: "Food and cover deficiencies are the greatest handicap to quail increase in Texas, and food and cover plants cannot be cultivated with guns, traps, and poison baits. We have yet to see the area in which an increase of quail could be satisfactorily traced to predatory animal control; favorable results from habitat improvement are many." Sanctuaries are no solution of quail maintenance problems because conditions on them change, usually to the detriment of the quail population. The bobwhite is favored by developmental stages of plant succession and, as a rule, repressed by climax conditions. Its management, therefore, consists chiefly in maintaining diversified vegetation with good interspersion of food and cover. Such phases of management as opening woodland, lopping over trees for cover, building brush-piles, strip-plowing, use of fire, and artificial planting are discussed, as is also the relation of grazing to quail. Suggestions are given as to steps in improving habitat in the four major plant formations frequented by Texas quail, namely; the loblolly-shortleaf pine forest, deciduous oak woodland, mesquite-acacia brush, and the tall-grass prairie as well as on small farms. Soil conservation work fits well into quail management and the work of the Texas Extension Service and of the U. S. Soil Conservation Service is commended. The effects of inferior cover and of poor food supply on bobwhites are graphically described; the discussion of carrying capacity brings out the factor of large coveys (150-300 birds) not taken account of in previous theorizing. During the course of the article, important food and cover plants are definitely named. The need of regulated hunting and of farmer-sportsman cooperation is emphasized. There is a summary and a bibliography of 26 titles.

Management: Brush-cutting

Stoddard, Herbert L. Use of mechanical brush-cutters in wildlife management, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 42-44, 3 pls.

Descriptions, illustrations, prices, and addresses of manufacturers of brush-cutters, machines employed for subjugation of jungle-like growths in the southeastern States. Notes on their use and their value to the wildlife manager in opening up forest and preparing fields for food planting.

Management: Cottontail

Gerstell, Richard. Management of the cottontail rabbit in Pennsylvania, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(2), May 1937, pp. 8-11, 32, 5 photos, 1 pl. (diagram of fox trap); 8(3), June 1937, pp. 12-15, 26, 4 photos, 4 figs. Parts 3 and 4 are available in reprint from the address given.

Parts 1 and 2 were abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 19-20; they dealt with restocking with imported animals and checks on the rabbit population. Part 3 reports upon propagation experiments both under a range system that was not satisfactory and under a small pen system that promised better results. This part describes also an intra-state trapping and transplanting scheme that has been an "unqualified success." The cost per animal was about 25 cents or only a fourth of that of rabbits shipped from western States. In furtherance of this system, it is proposed to establish and improve natural propagation areas from which surplus animals will be trapped and distributed where needed. On an area of about 2,000 acres, an average of more than 720 rabbits per year were trapped during a three-year period.

Part 4 deals with food and cover development and with refuges. It contains a good brief discussion of the manipulation of plant succession, names a variety of cultivated crops useful for rabbit food patches, and gives suggestions for improving cover. Sketches are given for improvement of rabbit habitat. Refuges containing all year rabbit requirements are necessary to the preservation of this animal.

Management: Environmental improvement

Sedam, John B. Environmental controls, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(3), June 1937, pp. 21, 27.

Report on food patch planting on State Game Lands and on the program of environmental manipulation being put into effect. Some of the practices are: release of game-food-producing trees, shrubs, and vines; pronounced thinning of forest stands; restricting planting of evergreens to small blocks; con-

struction of numerous wide fire lanes; removing most large trees from a plot in about every 40 acres of woodland; preservation of all hollow trees; felling browse trees in winter; building brush-piles; selective cutting.

Management: Farm game

Stanford, J. E. Game management on the farm, Southern Agriculturist (Nashville, Tenn.), 67(3), March 1937, p. 17, 1 fig.

A general article cited here to show the interest of a leading farm journal in the subject. Contains no specific suggestions.

Management: Farm game

Wilson, Kenneth A., and Ernest A. Vaughn. The Resettlement Administration and its wildlife program on the Eastern Shore of Maryland, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 14(2), Spring 1937, pp. 1-4, 18-20, 8 photos, 7 tables.

Report on 16 months work and the apparent results; the period covered an unusually severe and also a very mild winter. Raccoons were aided by planting of corn patches, a measure regarded as temporary; release of persimmon, beech, oak, and other food-producing shrubs and trees considered a more feasible method economically, and in the long run. Cottontails were catered to by feed patches of clover and rape and they became patrons also of quail feed patches of soybeans, cowpeas, and buckwheat. Scores of the plantings were made for quail; the birds responded, and held up well under hunting; pre- and post-season counts of birds on the same area were 202 and 161, respectively. The total population figures for the second winter contrasted with the first represented an 87 percent increase in coveys and a 129 percent increase in individual birds. Expressed otherwise there was one bird to 35 acres the first winter, one to 15 acres the second. [Abstractor's comment: Such studies should be continued long enough to show average results, taking fluctuational phenomena into consideration.] So long as available, the produce of feed patches appeared to be preferred to natural foods. Of 30 quail released in September in environment well prepared in advance, 29 were still living in late February; this too in the entire absence of "vermin" control. Feed patches of annual plants are too expensive for ordinary farm game management so perennials are being tried out. [The instruction as to boiling hard seeds in preparation for planting should be put in more precise form.] Food habit studies were made the first year by dropping analysis, the second by crop content studies; the latter technique is the better but the former is fairly valuable and has the advantage of not requiring the killing of birds. Both methods show waxmyrtle berries and ragweed achenes in the lead by bulk among quail food items; they also predominated in the crop and gizzard contents of 34 mourning doves. Notes are given on various other foods of both of these species of birds.

Management: Farmer-sportsman relationship

Anon. Farm game population increased in trials at Riley, Findings in Farm Science, Wisconsin Agr. Expt. Sta. Ann. Rep. Director (University of Wisconsin, Madison), 1935-36 (1937), pp. 61-62.

"In several areas of Wisconsin this Station is cooperating with sportsmen and farmers to learn what can be done, without too much expense, to restock the land with game. Such projects are underway at Faville Grove, near Lake Mills in Jefferson county; at Riley, in western Dane county; and near Elkhorn, in Walworth county. Similar work is underway at the University Arboretum and on the Station farms near Madison under the direction of Aldo Leopold (Game Management).

"The Riley game cooperative has now been underway for several years, and consequently the experience gained here may be of value to groups planning to launch similar projects elsewhere.

"Ten farmers contribute their land (a total of 2,000 acres) and some labor, while town members contribute the cash costs. The farmers share in all privileges, including shooting, on an equal basis. The group is organized under the shooting preserve law.

"The Experiment Station has kept a record of game stand, plantings, and kill since 1931. During this six-year period quail have increased from 40 to 180 birds. No quail have been planted, and none killed. Pheasants have increased from two to 200; about 100 are planted and some 50 killed each year.

"The record made at Riley shows that a stand of game can be built up, with little cash expense and no interference with farming, despite moderate hunting."

Management: Forest game

Shantz, H. L. Forest Service policy in game management, Calif. Fish and Game (250 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 77-84.

General remarks on deterioration of wildlife environment. The national forests were established to conserve the resources of timber, grazing, wildlife, and recreation, for protection of watersheds, stream flow, power, and to prevent soil erosion and floods. They embrace more than 200 million acres, or more than one acre of every ten in the United States. The permanent policy must be to raise this land to its highest social and economic use. The best use may not always be multiple use and certain areas may be exclusively devoted to definite purposes, including wildlife range. Wildlife means all forms of life, and its development and maintenance rests on the environment. Plant cover is basic and should be managed to produce the maximum benefits to wildlife. Overstocking must always be guarded against. In the forests as at present laid out and managed, shortage of good winter range is a limiting factor on game populations.

The Forest Service believes that management can be carried on in cooperation with States. Dr. Shantz said: "Within the limits of our multiple use program we wish to produce the best possible home for big game, upland birds, fish, waterfowl, fur bearers, and other wildlife. We wish to raise the best and largest crop for recreation purposes, hunting, fishing, and trapping. We wish to cooperate in every way with state and other agencies to this end."

"Our purpose is: To raise the forests to their highest potential production capacity; to balance the needs of a multiple use program; to consider the social as well as the economic; to cooperate with state agencies to accomplish these ends and in this way strengthen the wildlife program beyond the forest boundary; to bring every possible agency to aid the program; to broaden our program to increase the protection of species which are in danger of extermination; to encourage citizen organizations by a program of education to join in an attempt to attain for the future the security of a well managed present."

"The watersheds and soils must be protected. To this end we must not permit bad practices in recreation, grazing or wildlife management. We are charged by law with the responsibility of protecting and developing the national forests. To this end we can not allow destruction of the browse or grass cover by overstocking of domestic or game animals. To allow great herds to starve for lack of browse is to repeat the errors of the cattleman and the sheepman. They have paid the price of a lack of a planned program. We do not want to see the wildlife program hampered by a repetition or a continuation of this haphazard practice. There are many unknown facts important to a well managed program but to await the slow process of research before we attempt to apply what we now know would be fatal. We must use these facts and experiences we have at hand and change our policies as fas as necessary in the light of additional research.

"Where laws permit you can help us in making necessary reductions or give additional protection and where they do not permit you to do so we should work together to secure a change. Federal lands must be protected from wasteful and destructive practices but the Forest Service never desires to act alone or independently if it is possible by cooperation with you to avoid such action."

Management: Forest wildlife

Hosley, N. W. Some interrelations of wildlife management and forest management, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(7), July 1937, pp. 674-678.

Considers there is no antagonism between the production of trees and of game. "There seems to be no silvicultural operation which cannot influence wildlife to advantage, if properly used." Suggestions as to how cutting, weeding, and thinning may be so managed. Need for interspersion of coniferous and deciduous growths. Releasing of food-producing shrubs and trees and planting of the better kinds advised. Game harvests should be based on repeated censuses. Forest wildlife administrators should be trained in both forestry and

wildlife management. Continued research necessary; danger of generalizing from limited information; local nature of problems, and constant change in conditions. Bibliography of 10 titles. Comment: Optimism in this field is no doubt desirable and necessary but so long as planting continues to be largely of solid coniferous stands, and so long as the effect of timber stand improvement operations is to greatly reduce variety of growth in forests and to eliminate den trees and indispensable food species, there is still need for possimists who will not let these facts be forgotten.

Management: Forest wildlife

Trippensee, R. E. The development and use of state forests in New England in relation to wildlife, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(4), April 1937, pp. 403-408.

An optimistic treatment of the forestry-wildlife management problem. "In general good wildlife-management will favor good forestry x x x there need be little or no conflict x x x to neglect wildlife is to fail to use the land to its capacity." "Sustained yield for wildlife is a desirable objective of any balanced land-use policy." Notes on census taking, use of State lands for hunting, trapping, and fishing; environmental improvement; restocking; predator control; refuges; silvicultural operations in relation to wildlife and suggested modifications to favor wildlife. Bibliography of 10 titles.

Management: General

Wallace, Henry A. A product of the soil. As such, wildlife restoration is a problem of land management, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(2), March-April 1937, pp. 21, 27-28.

The Secretary of Agriculture's address at the Second North American Wildlife Conference, St. Louis, Mo., March 1937. "As I see it the problem of wildlife restoration is fundamentally one of land utilization." Notes on the program especially in its application to wildlife.

Management: Harvesting

Chapman, Floyd B. Controlled squirrel and rabbit hunting on State hunting preserves, 1936, Ohio Wildlife Research Sta. (Ohio State University, Columbus, Ohio) Release 37, 11 pp., 9 tables, mimeographed, June 1937.

The 1935 report was abstracted in WILDLIFE REVIEW, No. 4, June 1936, p. 15. The area involved, 3 State hunting preserves embracing more than 52,000 acres, is the same and the regulations and checking procedure were much the same. Counts had revealed a decline in the squirrel population, probable causes of which are discussed. Hunters were informed of the condition and only about a fourth as many came as in 1935. "The average hunter spent 4.6 hours in the field, required 3.4 hours to see each squirrel, walked 5.6 miles for each squirrel killed, hunted 6.2 hours for each squirrel bagged, and his expenditures

varied from 90 cents to $6.53 for each squirrel taken." There are notes on weights, ages, sex ratio, and physical condition of some 50 squirrels examined. There is an account also of controlled rabbit hunting on the same areas but this activity is less important.

Management: Harvesting, furs

Yeager, Lee E. Naturally sustained yield in a farm fur crop in Mississippi, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 28-36, 2 figs., 3 tables.

Trapping through 5 years yielded about the same number of skins each season and a net income that reimbursed the trapper for his time at the rate of 75 cents an hour. One of the tables shows what prices for skins of 5 species were received during the actual trapping period and what they would have brought in other years of differing economic conditions. Management suggestions based on the trapper's experience. Farm fur management can give the small farmer a much needed additional cash crop.

Management: Herd regulation

Hinkley, H. D. The Roosevelt elk of the Olympic Peninsula; Calif. Fish and Game (450 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 69-72.

In many areas the elk have destroyed most of their food and in some have become destructive to cultivated crops. Some means of reducing the numbers of animals is required but conflicts in public sentiment make it difficult to arrange.

Management: History

Tripponsee, R. E. Wildlife management in the United States: past present, and future, Forestry Chronicle (Box 43, Knowlton, Quebec, Can., 50 cents a copy), 12(4), Dec. 1936, pp. 375-381.

Broad definition of wildlife management; earliest roots in European game husbandry and forestry; exploitive use of wildlife in North America; realization of the debacle confronting wildlife and struggle to avert it; restrictive, yielding to productive, measures; research, education, and demonstration as at present examplified. Bibliography of 12 titles.

Management: Improving farm environment for wildlife

Morton, James N. Building better farm environment, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(2), May 1937, pp. 6-7, 28, 5 photos.

Preservation of cover; planting of food producing shrubs and vines; sowing of feed patches; suitable plants recommended.

Management: Planting pond environment

Nagel, Werner O., and Marion W. Clark. Improvement of farm ponds and watersheds for erosion control and wildlife production, University of Missouri Agr. Ext. Circ. (Columbia, Mo.) 361, 11 pp., 6 figs., April 1937.

Improvement of existing ponds and creation of new ones. Planting for wildlife is suggested under 8 categories: shelter and escape cover; protection for dam and spillway; escape and concealment cover and food; swamp nesting and concealment cover; grassy nesting cover; fencerow escape, nesting, and winter cover; food and shelter, oxygen production, for water life; and windbreak.

Management: Range

Anon. Laws and joint regulations of the Secretaries of the Interior and Agriculture relating to the protection and administration of game ranges, or wildlife refuges, established in conjunction with the organization of grazing districts under the Taylor Grazing Act, U. S. Dept. of Agriculture, Bureau of Biological Survey, Service and Regulatory Announcements (Biological Survey, Washington, D. C.), B. S. 86, 5 pp., April 1937.

Regulations concerning protection of wildlife; acts not permitted on game ranges or wildlife refuges; grazing; scientific collecting and investigating; removal of surplus animals; economic utilization of resources; and fishing. Extracts from pertinent legislation.

Management: Red fox

Errington, Paul L. Management of the red fox in Iowa, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(2), March-April 1937, pp. 24, 30-31.

General statement of food habits of the red fox and emphasis upon availability as controlling factor in choice of food. Discussion of depredations by foxes on poultry and young pigs. Methods preventing damage are recommended; their cost may be made up for by sale of the skins of foxes trapped on a farm. The conflict between quail hunters and fox hunters is scarcely warranted for it is conceivable that fox populations may be kept at levels reasonably satisfactory to both. On an area harboring numerous foxes, bobwhite losses were at as high a rate on portions of the tract that were hunted over for foxes as on those that were not. Importance of the fox as a fur animal; receipts in Iowa from sales of furs and of pups. Esthetic value; "Other things being equal, the man who would rather look at a fox track in the snow than watch a dog point a covey of quail, or vice versa, should be free to do so, without apologies, explanations, or the risk of being regarded as a crank." In the opinion of the author, however, there are probably twice as many foxes in Iowa as there should be, and it would be to the interests of the people and the foxes alike to lower the present fox population level. Hunting during the season of prime fur is the method recommended. Final paragraph: "I would suggest that we continue to strive for an intelligent understanding of predation as a natural phenomenon. When really severe depredations occur, there is

generally a good reason; and we could well afford to know a little more about what we are trying to do and why."

Management: Refuges

Lewis, Harrison F. A decade of progress in the bird sanctuaries of the north shore of the Gulf of St. Lawrence, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Can., 25 cents a copy), 51(4), April 1937, pp. 51-55, 1 fig., 3 tables.

History of the refuges and tables showing the population of the refuges at 5-year intervals. There have been fluctuations both by species and by localities, but also a general trend of increase. These changes and possible causes are discussed in some detail.

Management: Refuges

Zahniser, Howard. A grand tour of the major refuges where the wildlings of the air find sanctuary, American Forests (919 Seventeenth St., N. W., Washington, D. C., 35 cents a copy), 43(6), June 1937, pp. 286-292, 320, 10 photos.

Notes on the Federal migratory bird refuge program, and on the history, development, and inhabitants of 11 of the more important refuges established.

Management: Regulation of animal populations by hunting

Gordon, Seth. Conservation madness, Country Gentleman (Curtis Publishing Co., Philadelphia, Pa., 10 cents a copy), 107(5), May 1937, pp. 16-17, 91-92, 6 photos. Reprinted in Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(4), July 1937, pp. 4-7, 28, 6 photos.

The thesis of the paper, suggested mainly by experience in Pennsylvania, is that "more protection, and more and more restocking; x x x will not insure an abundance of wildlife." The history of deer in Pennsylvania is reviewed; from a "shot-out" condition in 1907 the animals increased under protection of refuges and a buck law until by 1922 in some areas they were noticeably encroaching on their subsistence. The difficulty of persuading hunters to shoot does was not overcome until they had 6 more years of experience with increasing depletion of natural food supplies and depredation upon farm crops and orchards. A parallel instance was furnished by beavers once extirpated but reintroduced beginning in 1917 and after that increasing so that it was only over considerable protest that an open season was declared in 1934 and another in 1936.

Reference is made to the overpopulation of deer in the Kaibab and Sun River national forests and of elk and buffalo in Yellowstone Park, control of which also was long resisted. Trapping the animals alive and shipping them elsewhere proved expensive and inadequate. The necessity of regulating the numbers of such animals confined to definite ranges mainly by hunting is

emphasized. Extension of this idea is made to populations of upland game birds in excess of the carrying capacity of the environment and harvesting by hunting is urged of high populations of species of a cyclic nature that are periodically swept away. "What conservation needs most is to rid itself of the blind spot which balks sensible management. More protection and more and more restocking where not needed, will never assure a proper abundance of wildlife. Without a favorable habitat, proper food, and cover, and the application of sensible management, we shall never attain our common goal of a well-rounded conservation program."

Management: Ruffed grouse

King, Ralph T. Ruffed grouse management, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(6), June 1937, pp. 523-532, 1 fig., 1 table.

Management suggestions resulting from 7 years of study of the ruffed grouse in Minnesota. Besides ordinary variation in number, this species is subject to periodic, and at present uncontrollable, oscillations, which, at approximately ten-year intervals, wipe out about 90 percent of the stock. Shooting of ruffed grouse should be permitted only when the birds are sufficiently numerous and the three major questions in its management are: (1) How can we determine in advance which years should be open?, (2) How can we provide for the greatest number of such open years in every ten-year period?, and (3) How can we provide the greatest amount of grouse shooting during each of these open years? The answer to the first question is careful and continued census-taking, for which a method so satisfactory has been developed that losses in population may be demonstrated in the month of May, amply early for any adjustment of regulations that may be required. The provision of the greatest practicable number of open years is almost wholly a matter of maintaining the maximum breeding population, which in Minnesota is a bird to four acres. This is the April maximum, but to have it there must be a margin in October to cover winter losses of nearly 20 percent. Greater loss indicates deficiency in environment, probably of cover. Providing the greatest amount of grouse shooting during each of the open years is a function of the annual productivity of young. Juvenile mortality is high, normally about 75 percent. Analysis of this loss is given; probably the greatest cause is weakness of eggs due to their production by the hen at a period when the food supply is reduced to the minimum both as to quantity and variety. Any possible improvement of the winter and early spring food supply, therefore, will be highly advantageous. Evergreen herbage, long-persistent fruits, and early spring greens should be encouraged. For the young, more openings should be provided as the herbaceous growth they support is valuable both directly and also for the insects it harbors. Cover is just as essential as food and must be of several types suitable for drumming, nesting, brooding, molting, and wintering. Suggestions are given as to each of these types. Water requirements and how they are met, and the interspersion of food and cover elements also are discussed.

Cyclic declines are not the result of overpopulation and can neither be eliminated or reduced in severity by increased shooting. Every protection should be given the birds from the very beginning of the decline so as to preserve the 4-6 year old individuals necessary for reproduction, and which have also the greatest powers of resistance to the decimating factors.

There are instructions for calculating the permissible take, that is the surplus less the 20 percent margin needed to meet winter losses, and the following general comment on shooting: "It is well to point out in this connection that this so-called allowable shootable take is actually surplus population; it is made up entirely of birds that can not survive the winter. Shooting limited to this part of the population can in no wise affect the continued existence of the species, and it is only when shooting is limited to these surpluses that it can properly be included under the term conservation. No species can be rightly included on the game list unless we know enough about that species to enable it to produce surplus populations and until we can demonstrate that such surplus populations actually exist. It is understood that shooting should always be limited to these surpluses." An excellent boiled-down account of management based on the author's unequalled knowledge of the ruffed grouse in Minnesota.

Management: Seed scarification

Stoeckeler, J. H., and L. C. Baskin. The Denbigh disc scarifier, a new method of seed treatment, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(4), April 1937, pp. 396-398, 1 pl.

"The working element is a series of sandpaper-covered discs revolving at a relatively high speed (from 500 to 900 r.p.m.) in a stationary metal cylinder also lined with sandpaper." At 750 r.p.m. a load of 10 pounds of juniper seed was reduced in weight 35 to 45 percent in four hours. Apparatus illustrated and described.

Management: Sexing beavers

Young, Floyd W. The identification of the sex of beavers, Michigan State College Agr. Expt. Sta. (East Lansing, Mich.) Special Bul. 279, 8 pp., 6 figs., Nov. 1936.

Method of holding a beaver for examination, description and illustrations of genitalia.

Management: Stocking, upland game birds in California

Bade, August. California's game farm program, Associated Sportsman (929 Pacific Bldg., San Francisco, Calif.), 3(6), June 1937, pp. 8-10, 10 photos.

Propagation and liberation of Mongolian, ring-necked, Reeves, and Elliott pheasants, Chukar partridges (5,000 released, 600 breeders remaining on State game farms), and Mexican wild turkeys. Effort is to find a suitable bird for each type of country, and in ability to take care of themselves the exotic species seem superior to the native. The Valley quail is an exception and receives equal attention with the pheasant and the Chukar partridge. States that pheasants are not subject to cyclic reduction.

Management: Trapping antelopes

Russell, Paul. Antelope transplanting is success, New Mexico (208 W. Gold Ave., Albuquerque, N. M., 15 cents a copy), 15(6), June 1937, pp. 32, 33, 1 photo.

History of reduction and restoration of the antelope herds of New Mexico. Description of trap and method of using it.

Management: Winter feeding

Anon. Winter feeding stations and foods for ground feeding birds in Michigan, State Dept. of Conservation, Game Division (Lansing, Mich.) Bul. 1, 8 pp., 7 figs., revised Nov. 1936.

Location, construction, and servicing of a variety of types of feeding stations.

Management: Winter feeding

Hawkins, Arthur S. Winter feeding at Faville Grove, 1935-36, Amer. Midland Naturalist(University of Notre Dame, Notre Dame, Ind., 50 cents a copy), 18(3), May 1937, pp. 417-425, 3 tables.

An area of 2,300 acres in Jefferson County, Wis., for which a statistical description, and game censuses both before and after the severe winter of 1935-36, are given. There is a discussion of the value of various sources of winter food as farmyards, crop residues and manure, cornfields, poison sumac, mast, Silphium, Bidens, ragweed, miscellaneous fruits and seeds, and bark and buds. Feeding stations and food patches and the likes and dislikes of game birds for them, are discussed. Experiments to determine palatability of the foods met various obstacles, nevertheless, it was apparent that yellow dent corn was greatly preferred to any other food. Palatability ratings were worked out experimentally for various foods compared to corn; examples are: wheat, 50; barley, 40; feterita, 25; and field peas, 15. Considerable data is presented on amount of grain food required and it is summarized for the most important species as follows: quail, 0.6 lbs. per individual per week; Hungarian partridge, 0.75; pheasant, 2.0; rabbit, 1.0; and squirrel, 2.0. The cost of winter feeding per farm was less than five dollars. Feeding definitely increases winter survival. An excellent paper of a type badly needed.

Propagation: Bobwhite

Bass, C. C. Raising quail on a large scale in confinement, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 7(5), May 1937, pp. 4-5, 8.

Report upon a tour of inspection that embraced quail farms in Georgia, Tennessee, Virginia, Maryland, Indiana, and Illinois. Brief notes on equipment and practices.

Propagation: Pheasant

Simpson, Gene M. What the Oregon game farms are doing, Calif. Fish and Game (450 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 51-56.

Principal points: Trial of open-topped holding pens for brailed birds; development of a new type combination coop and runway for rearing; production of a strain of brooding hens by crossing Buff Cochin bantams and Rhode Island Red fowls.

Propagation: Pheasant

Wessell, Charles W. Raising your pheasant chicks, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(2), May 1937, pp. 20-21, 3 photos.

Feather and body picking stopped by covering wounds with pine tar and supplying plenty of roosting bars; "rough" appearance of feathers due to overheating; slipped tendons due to too much protein in diet; "loose droppings" treated with two percent mercurochrome solution in water, or by a buttermilk flush; gape worms removed by a commercial inhalant.

Propagation: Vices

Kennard, D. C. Chicken vices, Ohio Agr. Expt. Sta. Bimonthly Bul. (Wooster, Ohio) 22(184), Jan.-Feb. 1937, pp. 33-39, 2 figs.

Although this article relates to chickens, its findings are of interest to game bird breeders. Vices include feather picking and cannibalism, manifested as toe, tail, wing, and vent picking. The great cause is overcrowding, but contributory factors are overheating, overlighting, irregular or insufficient feeding, deficient diet, and the presence of dead or injured birds. Prevention and control measures are discussed. The most effective is debeaking (removal of horny sheath tip of upper mandible) which is described and illustrated.

Propagation: Wild turkey

Russell, V. C. Wild turkeys are grown on Missouri ranch. Birds are used for restocking game preserves, Turkey World (Mount Morris, Ill., 15 cents a copy), 12(5), May 1937, pp. 24, 63-65, 1 photo.

Description of State turkey farm in Reynolds County, Mo. Hens are enclosed in pens guarded against predators but accessible to wild toms. Eggs are hatched in incubators and the young reared in fly-tight brooder houses. The greatest precautions are employed to assure sanitation. The poults are kept in the brooders for about 6 weeks then transferred to range pens. Commercial feeds are used and buttermilk is freely administered.

Research

Hicks, Lawrence E. Wildlife problems in need of research, Ohio Wildlife Research Station (State University, Columbus, Ohio) Release No. 28, 5 pp., mimeographed, 1937.

Need for presentation of results of research in varied forms adapted to different readers and purposes; the man who has done the research is in best position to do this. [Abstractor's addition, "if he can write intelligently"] Means of conveying information to the public. Need of research on groups of related problems, and of the ecological approach; value of the land-use outlook. His "theory of substitution" has been expressed elsewhere by the statement that management principles need not vary much from area to area but that the materials used almost necessarily must vary. Usefulness of research in the field of farmer-sportsman relationships. Mention of neglected groups as the mice and shrews. Thorough-going studies of animal populations and of wildlife yields, and originality in research are other needs that are stressed.

Research

Leopold, Aldo. The research program. Scientific research is the rock upon which wildlife restoration must be built, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(2), March-April 1937, pp. 22, 28.

Vast expenditures for wildlife are being made without adequate allotment for research. Suggestions as to needed investigations of waterfowl, rare species, fishes, songbirds, and wild flowers. Research needs not only support but security. Hence it is important: "(1) That donors of funds learn to wait for results, (2) that research personnel be more stringently weeded, (3) that projects be attached to really versatile institutions able and willing to follow where the clues lead, and (4) that research areas be protected against upset."

Wildlife management and education for this profession are now in a "boom" condition and must be brought down to a solid and justifiable basis. A controlling element in the whole movement--the landowners, are being neglected, and their education must at least keep pace with that of wildlife managers.

Research: Miscellaneous results

Leopold, Aldo. The wildlife program of the university, Wisconsin Sportsman (Madison, Wis., 10 cents a copy), June 1937, p. 8, 3 photos.

Brief announcement of findings of research projects. Only 28 percent of 1,341 forty-acre tracts examined in winter of 1932 had enough cover to hold pheasants, and only 9 percent enough to hold any quail. In a bad winter like 1936 a pheasant, rabbit, squirrel, or prairie chicken eats 2 pounds of grain per week, a Hungarian partridge one pound, and a quail half a pound. The preferred foods at feeding stations are, in order, corn, wheat, buckwheat, sorghums, soybeans, barley, oats, and rye. Grazing depletes food plants valuable for wildlife and a part of each marsh and woodlot should be protected by fencing. Cover is deficient on most farms and should be protected from the axe and from fire and supplied where missing. Studies on predator control to date may be summed this way:

"1. We have obtained satisfactory increases in game in some cases without any predator control.

"2. In cases where we failed to get an increase, we find little evidence that 'vermin' were responsible for the failure.

"3. We find in all cases plenty of evidence that predators are preying on the rodents, some of which rob nests, some of which are important enemies of game cover, and all of which compete with game for food.

"4. Where we do encounter evidence of heavy inroads on game, it is always where the game has increased beyond the capacity of the food and cover, as proved by accompanying starvation. Food and cover appear to be better predator control than shotguns.

"5. We do not know of any case where an increase in game has been obtained by predator-control alone."

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-83. Birds in relation to fishes, by Clarence Cottam and F. M. Uhler, May 1937, 16 pp.

A revision of the paper published in the Progressive Fish Culturist for January 1936, abstracted in WILDLIFE REVIEW, No. 3, April 1936, p. 8.

BS-87. Some accomplishments of the cooperative research units, a summary to January 31, 1937, by Hartley H. T. Jackson, April 1937, 10 pp.

List of leaders and their addresses at 9 land grant colleges. Brief notes on the progress of organization and investigation at each place.

BS-88. The waterfowl situation: 1936-37, May 1937, 10 pp., 1 table, 3 maps, 1 chart.

Notes on the 1936 breeding ground survey, the fall migration, investigations in Mexico, and the January inventory. Improvement in the waterfowl situation is reported.

BS-91. Research studies in the control of destructive mammals, by F. E. Garlough, May 1937, 12 pp., 3 figs.

Report of the Director of the Denver Control Methods Research Laboratory on conditions favoring pest increase, investigations of habits and control of meadow mice, pocket gophers, other rodents, and coyotes. Methods of control, development of selective poisons, and protection of innocent species.

BS-93. The controlled hunting areas and the pheasant refuge-management system in northwestern Ohio, by Lawrence E. Hicks, April 1937, 10 pages, 1 ma

Revision of the paper of same title abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 21-22.

SPECIAL ARTICLE

Nutritive value of maize

An interesting pair of palatability ratings supplies the stimulus for this note, long in contemplation. Hawkins (1937, p., 422) uses yellow dent corn, whole, as the standard--100 percent--of palatability of various foods consumed by wildlife at winter feeding stations. Yet yellow dent corn, ground, has a rating of only 35 percent. Thus while the substance was the same, the form in which it was offered made a difference of almost two-thirds in palatability. The ratings therefore cannot be accepted as strictly reliable indications of nutritive value. Corn has been hailed as the most important winter food for wildlife in the upper Mississippi Valley, and as almost a *sine qua non* for winter survival of game birds there, but something needs to be said on the other side.

Something was said very definitely more than 20 years ago but wildlife specialists, not experts in animal nutrition, probably are not aware of it. Rommell and Vedder (1915) say tersely, "Corn is notoriously deficient as a single feed for animals, and it must be properly balanced to be fed satisfactorily." In a recent letter one of these authors, Professor E. B. Vedder, now in the George Washington University School of Medicine, says: "The proteins contain 21 amino-acids, of which 4, tryptophane, tyrosin, lysin, and cystine, are essential to life. Zein, one of the proteins of maize, contains no lysin or tryptophane.

Glutelin another protein of corn contains all the amino acids, But when a single grain is eaten, some of these amino acids are usually deficient in amount and thus growth is stunted. In addition corn is deficient in vitamin A and vitamin B, contains no vitamin C or vitamin D. These deficiencies must be made up by various additions to a corn diet." (Sept. 25, 1936.) The same point is made by Professor E. W. Callenbach of the Department of Poultry Husbandry of Pennsylvania State College, well known for his studies of the nutrition of game birds. He writes, "Nutritional work with all sorts of animals has shown that corn is not satisfactory and particularly with young growing stock where the protein requirement is high. The simple lack of protein in quantity as well as quality is sufficient to render the use of corn alone, impossible." (Oct. 17, 1936.)

Dr. Paul E. Howe, Chief, Animal Nutrition Division, U. S. Bureau of Animal Industry, states, "Corn is generally deficient in the quantity and quality of protein and in calcium. Animals that eat corn and have access to grass do well; a great deal depends on the nature of the green grass. Poultry fed corn with access to range do fairly well." (Sept. 10, 1936.)

John C. Hammond in a report on The McCollum feeding project with chickens (1934, p. 36) states that, "Yellow corn proved to be an excellent base around which to build a diet, although its low and unbalanced protein and low calcium content had to be corrected by some efficient supplement such as dried buttermilk."

Pheasant breeders generally avoid feeding corn to their birds during the period when they are preparing them for the breeding season. They attribute difficulties with corn at this time to its fattening quality, but the trouble may really be deficiency in some element essential to reproduction.

In another field of husbandry, the defects of corn are freely acknowledged F. B. Morrison in his standard text on Feeds and Feeding (20th Ed. 1936) is quoted in the following excerpts, "Corn is also unusually low in mineral matter, especially calcium. Indeed corn has but 0.01 percent of calcium. This means that there is only 0.2 lb. of calcium in an entire ton of the grain. Corn is also lower in phosphorus than oats, wheat, barley, or rye (p. 328). x x x No single fact in stock feeding has been more clearly demonstrated by numerous feeding trials than that corn alone gives exceedingly poor results when fed to growing and fattening pigs (p. 851). x x x Corn alone is just as unsatisfactory for pregnant sows as it is for young pigs. Farmers who persist in wintering their sows on this poor ration have no basis for complaint if their pig crop is a failure." (p. 852.)

It is quite evident that before wildlife managers go in any more enthusiastically for corn they had better "stop, look, listen." As recommended elsewhere, they will do well to obtain the cooperation in their experimental work of experts in animal nutrition.

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1934. The McCollum Feeding Project, Part II., U. S. Egg & Poultry Magazine, 40(12), December, pp. 30-37.

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1915. Beri-beri and Cotton-seed Poisoning in Pigs, U. S. Dept. Agr. Journ. Agr. Research, 5(11), pp. 489-493.

NOTES AND NEWS

I. T. Bode in charge of cooperative work between the Extension Service and the Biological Survey has begun a series of Informational Notes of which No. 1 was issued in February and No. 2 in May, 1937. The table of contents of No. 2 reads as follows: Providing leadership for wildlife conservation, Wildlife conservation in 4-H Club programs, Camping days are with us, The Extension Service and wildlife management, and References to wildlife material.

By an amendment to the National Forest regulations promulgated by the Secretary of Agriculture, the Forest Service is authorized to designate "Vanishing Species Areas" within the National Forests, wherein wildlife species threatened with extinction or rare plant species will be protected. The amendment is designed to protect: "(a) rare or vanishing species of plants or animals, (b) special biological communities, or (c) historical or archeological places or objects of interest." California condors in the Los Padres National Forest in California are among the first beneficiaries of this provision.

Attention was drawn in WILDLIFE REVIEW, No. 5, Sept. 1936, p. 32, to a Pennsylvania law providing for the regulation of roadside menageries. It has since been learned that Connecticut has a law passed in 1923, and revised in 1927, that forbids under penalty, the exhibiting of any wild animal in connection with any business for the purpose of attracting trade.

The National Association of Audubon Societies, 1775 Broadway, New York City, distributes, free of charge, so long as funds permit, the following literature on Persecuted Species: What hawks eat, eastern (single sheet); What hawks eat, western (single sheet); Enter hawk--exit mouse (4 pages); What about hawks (12 pages); Evils that lurk in the bounty system (8 pages); Case of the hawk (4 pages), and a colored hawk and owl poster (14" x 30").

The Association has just issued also a booklet "Ducks for tomorrow" (16 pp., June 1937) that may be of interest to some of our readers. It consists mainly of the views of three authorities on the wild fowl situation. One of these, anonymous, describes general violation of Federal regulations in the Chesapeake Bay region. For California, W. Lee Chambers reports ever dwindling flights and much illegal killing due to inability of hunters to distinguish the protected species of wild ducks, and urges a closed season in 1937. Nash Buckingham, reporting on the middle Mississippi River region, emphasizes the destructiveness of commercial shooting establishments and the gradual extirpation of ducks under the regulations; he suggests closing the season, by injunction if possible, until the waterfowl show a definite upward trend.

The Journal of Wildlife Management published by The Wildlife Society has made its appearance. The Journal is planned as a quarterly and the first issue is styled Nos. 1-2, July 1937. It comprises 48 pages, 3 plates, and various figures and tables and contains a statement of policy, a few short notes, and five articles bearing on wildlife management. These are by Paul L. Errington, Harley J. Van Cleave, Lee E. Yeager, F. C. Edminster, and Herbert L. Stoddard and all are abstracted in preceding pages. Subscription to The Journal of Wildlife Management is $3.00 per year; single copies 75 cents each. Correspondence relative to the Journal or about membership in The Wildlife Society, which includes subscription to the Journal, should be addressed to Victor H. Cahalane, Secretary, National Park Service, Washington, D. C.

The Flicker, published quarterly by The Minnesota Bird Club and formerly mimeographed, is now appearing in printed form. Volume 9, No. 1, March 1937, has 12 pages and a cover. The subscription price is $1.00 per year. Communications should be addressed to the Editor, G. N. Rysgaard, 1400 Capitol Ave., St. Paul, Minn.

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